



# An Ultra-Compact Imaging Spectrometer for the Lunar Surface: Enabling Volatile Mapping and Unraveling the Moon's Geologic History

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**Platform:** Lander or Rover

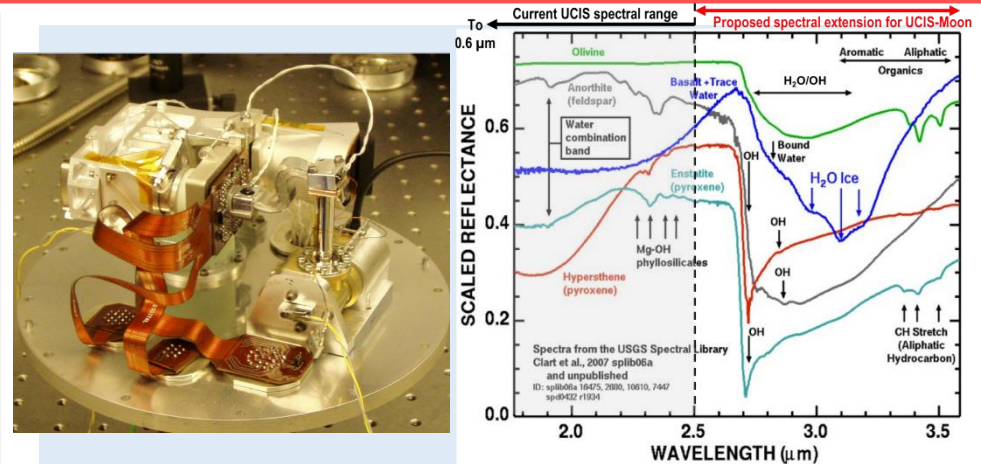
## Science:

- Uses well-established SWIR imaging spectroscopy to map H<sub>2</sub>O, OH, organics, and igneous compositions from spatially contiguous spectra
- Understand the sources, distribution, temporal variability, and ISRU potential of lunar volatiles
- Understand igneous processes on the Moon
- Understand lunar stratigraphy
- Understand space weathering on the Moon

## Objectives:

- Mature the Ultra Compact Imaging Spectrometer (UCIS) to TRL6 optimized for lunar volatile science via three tasks:
- 1. Incorporate a new detector array that supports a 0.6 – 3.6  $\mu\text{m}$  spectral range.
- 2. Advance thermal design to allow operation in lunar environment.
- 3. Develop on board processing algorithms to enable rapid return of most important products.

**CoIs:** Diana Blaney, Robert Green, Ian McKinley, Pantazis Mouroulis, David Thompson - JPL;  
Bethany Ehlmann - Caltech.



(left) UCIS prototype, initially developed and optimized for Martian geology and thermal environment. We will extend the wavelength coverage to optimize the instrument for lunar volatile science and cope with lunar temperatures. (Right) Laboratory measurements showing the character and diversity of OH species, molecular H<sub>2</sub>O, and water ice absorptions that would be distinguishable with the expanded spectral range.

## Key Milestones:

- Y1Q3: Critical design review
- Y1Q4: Algorithm methods and test datasets finalized
- Y2Q4: Integration and testing complete
- Y3Q1: FPGA implementation complete
- Y3Q3: TVAC testing complete
- Y3Q4: Full demonstration with FPGA testing, instrument TRL6 report

TRL (4) to (6)